



(11) **EP 4 521 739 A3**

(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:  
**07.05.2025 Bulletin 2025/19**

(43) Date of publication A2:  
**12.03.2025 Bulletin 2025/11**

(21) Application number: **25153399.8**

(22) Date of filing: **29.05.2020**

(51) International Patent Classification (IPC):  
**H04N 19/12 (2014.01) H04N 19/136 (2014.01)**  
**H04N 19/176 (2014.01) H04N 19/70 (2014.01)**  
**H04N 19/157 (2014.01) H04N 19/105 (2014.01)**  
**H04N 19/119 (2014.01) H04N 19/122 (2014.01)**  
**H04N 19/61 (2014.01)**

(52) Cooperative Patent Classification (CPC):  
**H04N 19/12; H04N 19/136; H04N 19/157;**  
**H04N 19/176; H04N 19/70; H04N 19/105;**  
**H04N 19/119; H04N 19/122; H04N 19/61**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB**  
**GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO**  
**PL PT RO RS SE SI SK SM TR**

(30) Priority: **30.05.2019 JP 2019101179**

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:  
**20813248.0 / 3 979 642**

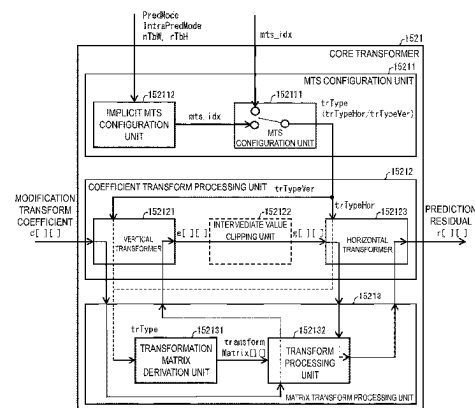
(71) Applicant: **Sharp Kabushiki Kaisha**  
**Sakai City, Osaka 590-8522 (JP)**

(72) Inventors:  
• **IKAI, Tomohiro**  
**Sakai City, Osaka, 590-8522 (JP)**  
• **HASHIMOTO, Tomonori**  
**Sakai City, Osaka, 590-8522 (JP)**

(74) Representative: **Müller Hoffmann & Partner**  
**Patentanwälte mbB**  
**St.-Martin-Straße 58**  
**81541 München (DE)**

(54) **IMAGE DECODING DEVICE AND METHOD**

(57) There is a problem in that implicit MTS performance is lost in a case that the implicit MTS is combined with secondary transform. The present invention provides an image decoding apparatus that can more preferably apply transform by MTS and secondary transform. A video decoding apparatus includes: a second transformer configured to apply transform using a transform matrix to the transform coefficient to modify the transform coefficient in a case that secondary transform is enabled; a first transformer configured to apply separate transform including vertical transform and horizontal transform to the transform coefficient; and an implicit transform configuration unit configured to disable implicit transform in a case that the secondary transform is enabled, an intra subpartition mode is not used, and subblock transform is not used, and configured to derive a horizontal transform type according to a width of a target TU and derive a vertical transform type according to a height of the target TU in a case that the implicit transform is enabled. The first transformer performs transform according to the vertical transform type, and transform according to the horizontal transform type.



**FIG. 18**

**EP 4 521 739 A3**



EUROPEAN SEARCH REPORT

Application Number

EP 25 15 3399

5

DOCUMENTS CONSIDERED TO BE RELEVANT

10

15

20

25

30

35

40

45

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	<p>NASER (TECHNICOLOR) K ET AL:                      "CE6-Related: NSST with 8 Coefficients Computation - Specification text file (Spec_text-test1.docx) attached to the document",                      126. MPEG MEETING; 20190325 - 20190329; GENEVA; (MOTION PICTURE EXPERT GROUP OR ISO/IEC JTC1/SC29/WG11),                      ,                      no. m47189                      22 March 2019 (2019-03-22), XP030211044,                      Retrieved from the Internet:                      URL:http://phenix.int-evry.fr/mpeg/doc_end_user/documents/126_Geneva/wg11/m47189-JVET-N0509-v3-JVET-N0509-v3.zip                      Spec_text-test1.docx                      [retrieved on 2019-03-22]                      * Sections 7.4.7.5 and 8.7.4.1 (in particular page 10, derivation of the the variable implicitMtsEnabled) *                      -----</p>	1-4	<p>INV.                      H04N19/12                      H04N19/136                      H04N19/176                      H04N19/70                      H04N19/157</p> <p>ADD.                      H04N19/105                      H04N19/119                      H04N19/122                      H04N19/61</p>
A	<p>BROSS B ET AL: "Versatile Video Coding (Draft 5)",                      126. MPEG MEETING; 20190325 - 20190329; GENEVA; (MOTION PICTURE EXPERT GROUP OR ISO/IEC JTC1/SC29/WG11),                      ,                      no. m48053                      29 May 2019 (2019-05-29), XP030212625,                      Retrieved from the Internet:                      URL:VVC                      http://phenix.int-evry.fr/mpeg/doc_end_user/documents/126_Geneva/wg11/m48053-JVET-N1001-v7-JVET-N1001-v7.zip                      JVET-N1001-v7.docx                      [retrieved on 2019-05-29]                      * Sections 8.4.7.1 and 8.4.7.2 *                      -----                      - / - -</p>	1-4	<p>TECHNICAL FIELDS SEARCHED (IPC)</p> <p>H04N</p>
The present search report has been drawn up for all claims			

1

50

55

EPO FORM 1503 03.82 (P04C01)

Place of search <b>The Hague</b>	Date of completion of the search <b>27 March 2025</b>	Examiner <b>Colesanti, Carlo</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone                      Y : particularly relevant if combined with another document of the same category                      A : technological background                      O : non-written disclosure                      P : intermediate document</p>		<p>T : theory or principle underlying the invention                      E : earlier patent document, but published on, or after the filing date                      D : document cited in the application                      L : document cited for other reasons                      .....                      &amp; : member of the same patent family, corresponding document</p>



EUROPEAN SEARCH REPORT

Application Number  
EP 25 15 3399

5

DOCUMENTS CONSIDERED TO BE RELEVANT

10

15

20

25

30

35

40

45

50

55

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	SAXENA ANKUR ET AL: "Low Latency Secondary Transforms for Intra/Inter Prediction Residual", IEEE TRANSACTIONS ON IMAGE PROCESSING, IEEE, USA, vol. 22, no. 10, 1 October 2013 (2013-10-01), pages 4061-4071, XP011525929, ISSN: 1057-7149, DOI: 10.1109/TIP.2013.2270087 [retrieved on 2013-09-05] Section I.; * abstract *	1-4	TECHNICAL FIELDS SEARCHED (IPC)
X,P	IKAI (SHARP) T: "Non-CE6: Harmonization of implicit MTS and LFNST", 15. JVET MEETING; 20190703 - 20190712; GOTHENBURG; (THE JOINT VIDEO EXPLORATION TEAM OF ISO/IEC JTC1/SC29/WG11 AND ITU-T SG.16 ), , no. JVET-00214 ; m48323 25 June 2019 (2019-06-25), XP030218877, Retrieved from the Internet: URL:http://phenix.int-evry.fr/jvet/doc_end_user/documents/15_Gothenburg/wg11/JVET-00214-v1.zip JVET-00214/JVET-00214_implicitMTS.docx [retrieved on 2019-06-25] * the whole document *	1-4	
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>27 March 2025</b>	Examiner <b>Colesanti, Carlo</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)